

# *An Information Tool to Assist in the Surveillance of Occupational Diseases*

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# *The Need for Toxicology Information*



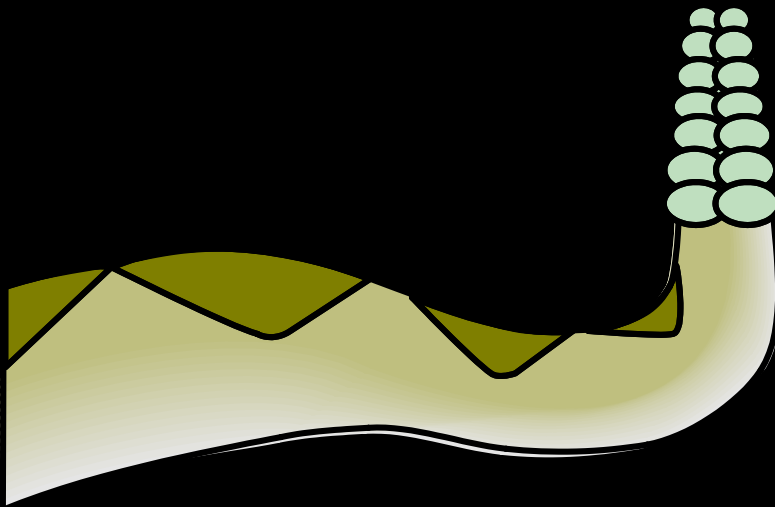
- To identify significant exposures;
- To provide evidence-based risk communication;
- To support decisions on the frontlines of workplace surveillance;

# *Occupational Diseases Are Difficult to Recognize*



- Resemble non-occupational diseases
- Low prevalence
- Inadequate training of medical students
- Thousands of jobs, chemicals and diseases

# *Chemicals Cause Disease If Three Conditions Are Met:*

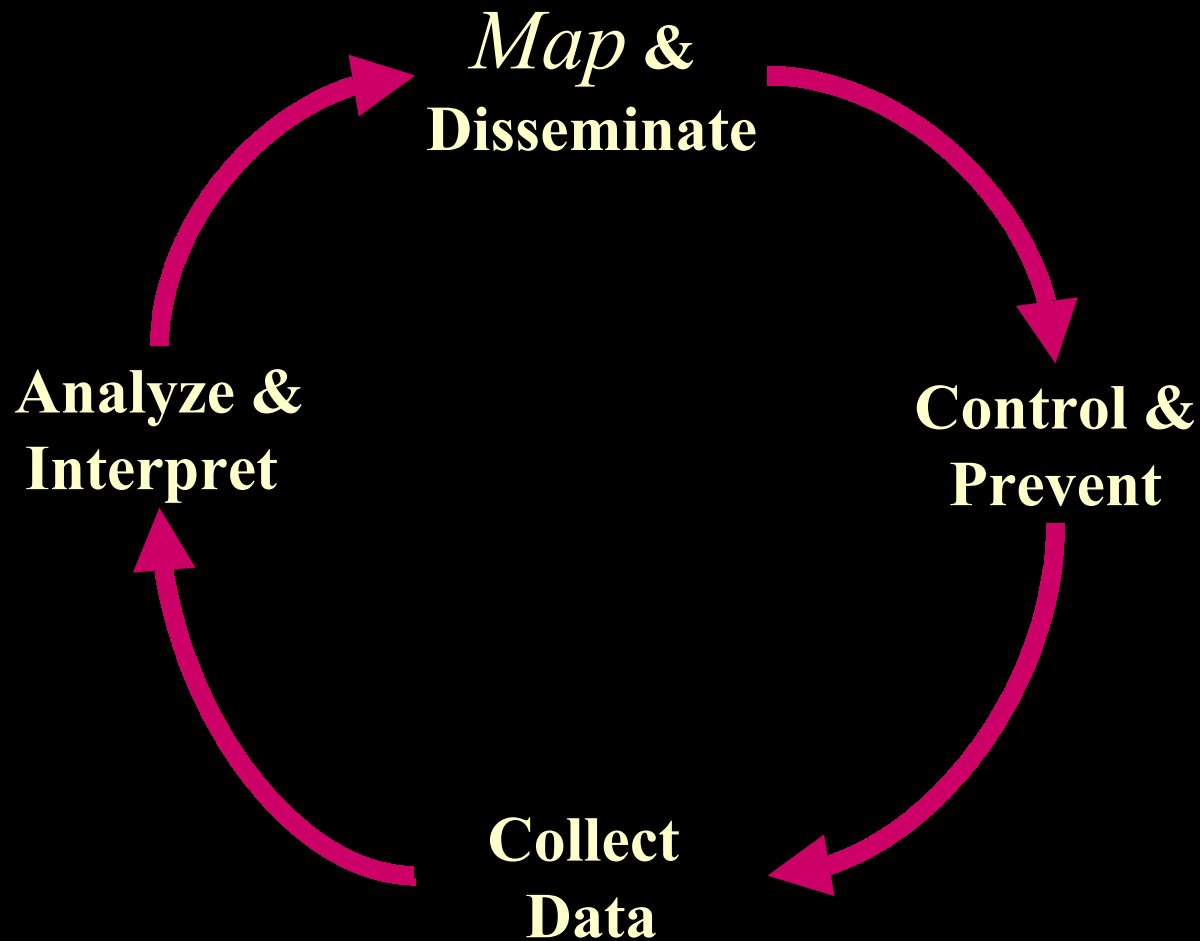


1. The chemical is toxic—it can damage one or more organs;
2. An exposure route exists for the chemical to enter the body;
3. A sufficient dose is received;

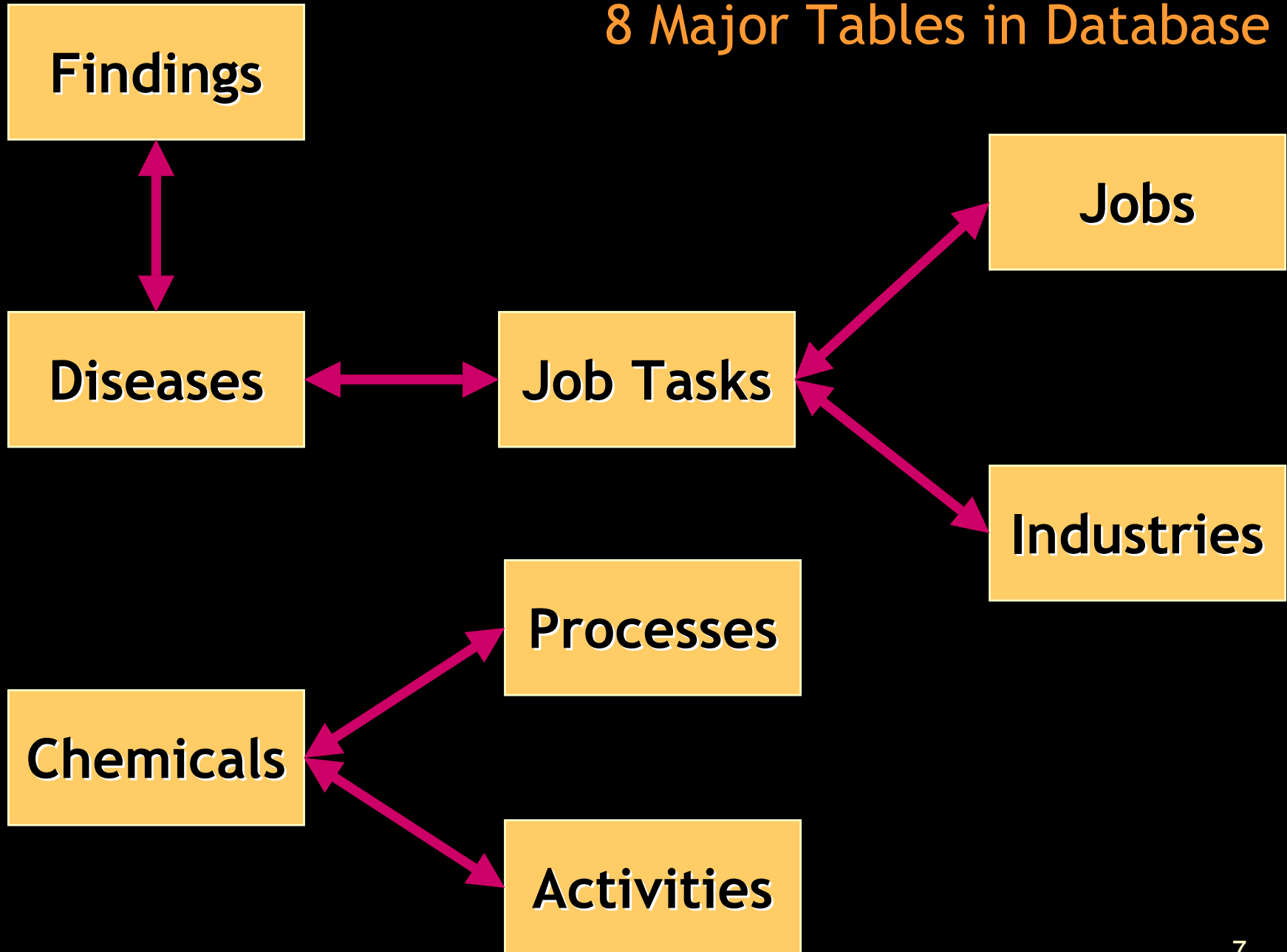
# *The Surveillance Cycle*

- Collection of data
- Analysis and interpretation
- Dissemination
- Action to control and prevent

# *The e-Surveillance Cycle*



## 8 Major Tables in Database



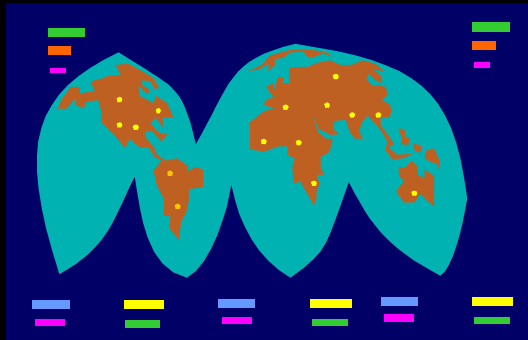
# *What Is a Relational Database?*

1. Gather information;
2. Sift through information;
3. Add drawers;
4. Add file folders;
5. File information;
6. Revise file folders;
7. Revise drawers;
8. Continue at step 1;





# *What Is an Intelligent Relational Database?*



- A map begins with a broad outline.
- Details are added.
- Part-to-whole relationships are depicted.
- Intended use determines selection of content.

# *Where Does the Information Come From?*

- Journals and Monographs
- Books
- CD-ROM Databases
- Web Sites

# *How Is the Information Stored in the Database?*

- Agents: 9 Major Categories and 86 Minor
- Processes: 9 Categories
- Activities: 3 Categories
- Hazardous Job Tasks: 8 Categories
- Findings: 14 Categories

# *Standard Coding Classification Systems Used in Haz-Map*

TABLE	CODING SYSTEM
Jobs	SOC
Industries	SIC
Findings, Diseases	ICD-9

# *The Broad Outline of Haz-Map Is Eight Related Tables*

160 Diseases

987 Agents (Chemicals)

180 Job Tasks

48 Processes

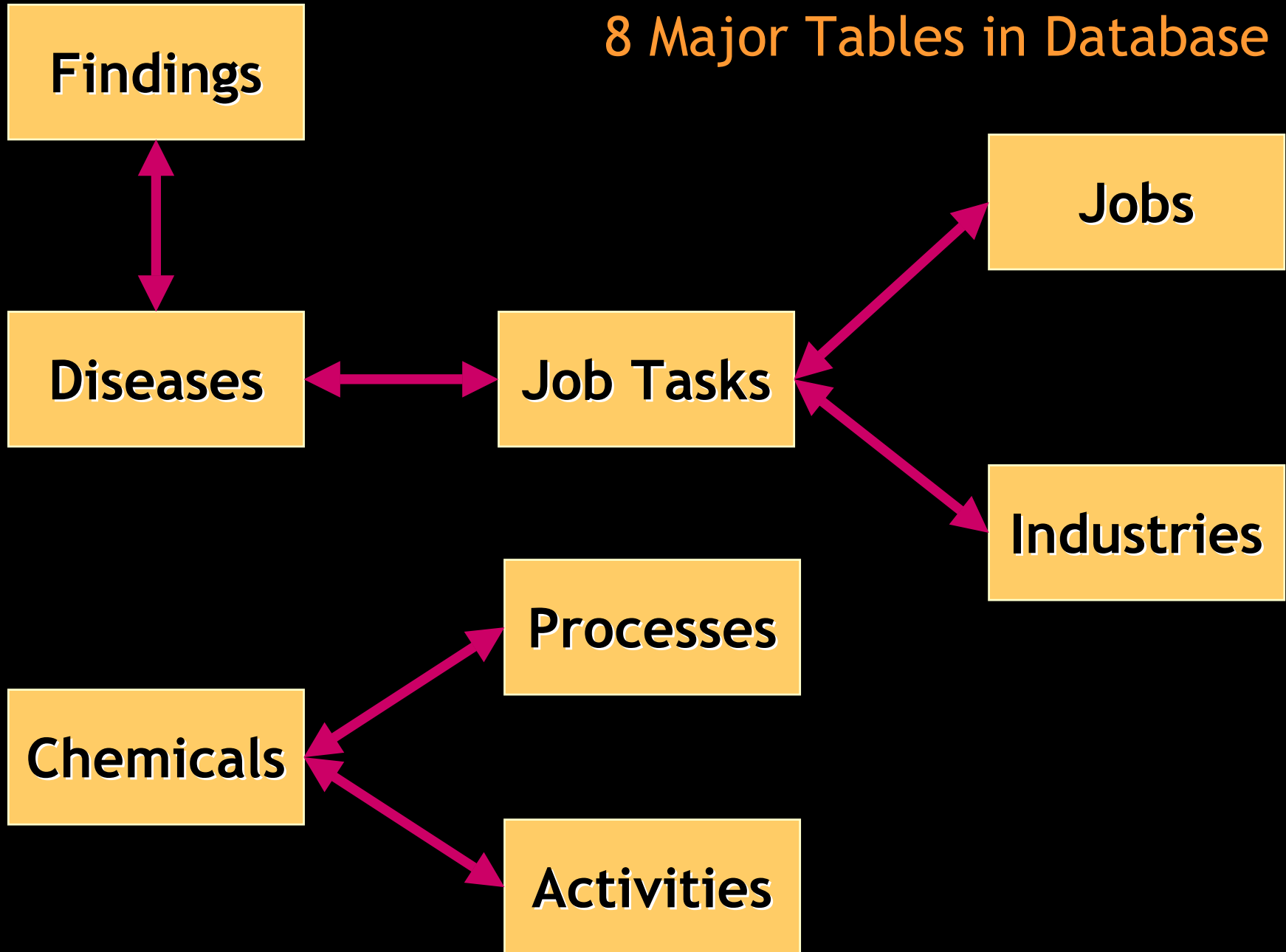
274 Jobs

26 Activities

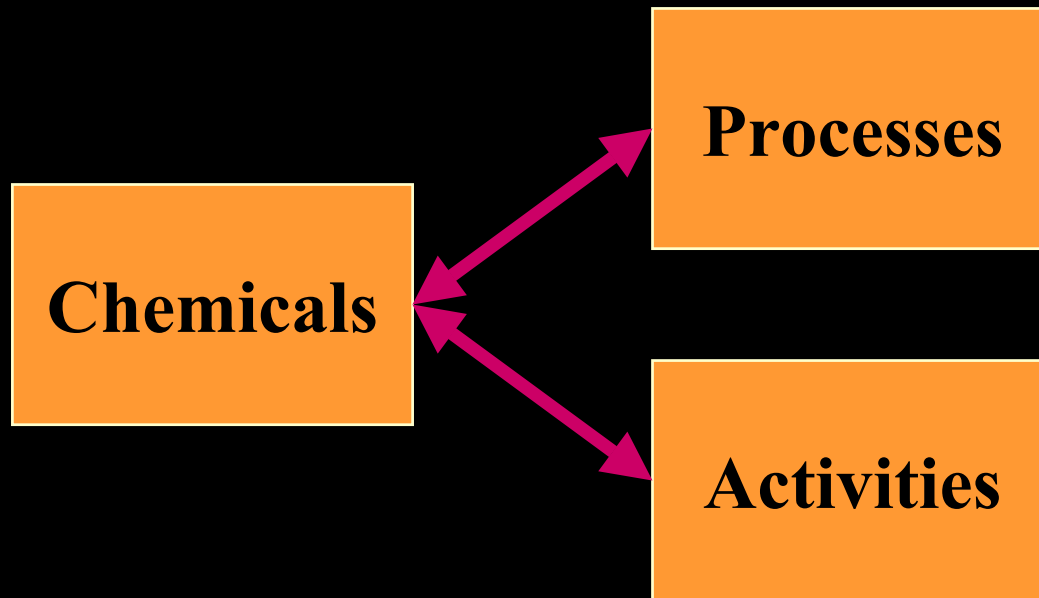
443 Industries

116 Findings

## 8 Major Tables in Database



# *The Chemicals Level*



# *Toxic Chemicals Can Damage One or More Organ Systems*

- Lung Toxins
- Neurotoxins
- Skin Toxins
- Hematotoxins
- Hepatotoxins
- Kidney/Reproductive Toxins
- Carcinogens



# *The Agents Form: Adverse Effects*

**AGENTS**

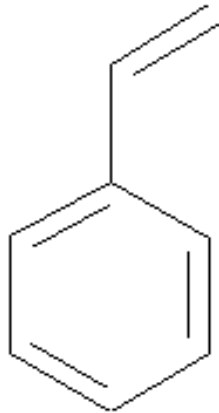
Agent Profile | Exposure Assessment | **Adverse Effects** | Processes/Activities

**Lead** Effects Points **12**

<u><b>LUNG TOXIN</b></u> <input type="checkbox"/> Asthma <input type="checkbox"/> Pneumonitis <input type="checkbox"/> Fibrosis <input type="checkbox"/> Chronic Bronchitis <input type="checkbox"/> Lung Cancer	<u><b>NEUROTOXIN</b></u> <input checked="" type="checkbox"/> Motor Neuropathy <input type="checkbox"/> Sensorimotor Neuropathy <input type="checkbox"/> Parkinson's Syndrome <input type="checkbox"/> CNS Solvent Syndrome <input type="checkbox"/> Other CNS Neurotoxin	<u><b>DERMATOTOXIN</b></u> <input checked="" type="checkbox"/> PACD <input checked="" type="checkbox"/> PICD <input checked="" type="checkbox"/> Chloracne <input checked="" type="checkbox"/> Skin Burns <input type="checkbox"/> ACD	<u><b>OTHER POISON</b></u> <input checked="" type="checkbox"/> Organophosphate <input checked="" type="checkbox"/> Organochlorine <input checked="" type="checkbox"/> Uncoupler <input checked="" type="checkbox"/> Chemical Asphyxiant <input checked="" type="checkbox"/> Simple Asphyxiant <input checked="" type="checkbox"/> Carbamate
<u><b>HEMATOTOXIN</b></u> <input checked="" type="checkbox"/> MetHgb, Primary <input checked="" type="checkbox"/> MetHgb, Sec. <input type="checkbox"/> Aplastic <input checked="" type="checkbox"/> Hemolytic	<u><b>LIVER/KIDNEY/REPRODUCTIVE</b></u> <input checked="" type="checkbox"/> Hepatotoxin, Primary <input checked="" type="checkbox"/> Hepatotoxin, Secondary <input checked="" type="checkbox"/> Nephrotoxin <input checked="" type="checkbox"/> Reproductive Toxin	<u><b>IARC CARCINOGEN</b></u> <input type="checkbox"/> Known <input type="checkbox"/> Probable <input checked="" type="checkbox"/> Possible	

Record: 1 of 989

# The Agents Form: Agent Profile

AGENTS			
Agent Profile	Exposure Assessment	Adverse Effects	Processes/Activities
<b>Styrene</b>		Hazard Score 15	
CAS #	100-42-5	<b>Synonym</b> Ethenyl benzene, Phenylethylene, Styrene monomer, Styrol, Vinyl benzene	
Category	Styrenes	<b>Description</b> Colorless to yellow, oily liquid with a sweet, floral odor;	
Major Category	Plastics & Rubber	<b>Sources/Uses</b> "Styrene is used extensively in the manufacture of plastics, rubber, and resins. About 90,000 workers, including those who make boats, tubs and showers, are potentially exposed to styrene." [http://www.osha-slc.gov/SLTC/styrene/]	
Formula	C8-H8	<b>Comments</b> Liquid causes first degree burns on short exposure; [CHRIS] There is evidence that occupational exposure to styrene in high concentrations over long periods of time can cause chronic encephalopathy similar to "Painters' syndrome" caused by other organic solvents. [p. 1096-1097, Sullivan] Occupational asthma and skin sensitization have been reported after repeated or prolonged exposure. [International Chemical Safety Cards]	
		<b>Restricted Use</b>	

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# The Agents Form: Exposure Assessment

**AGENTS**

Agent Profile | **Exposure Assessment** | Adverse Effects | Processes/Activities

**Styrene** Exposure Points

<b>TLV</b> <input type="text" value="20"/>	<b>Conversion</b> <input type="text" value="4.26"/> <i>X ppm value = mg/m3 value</i>	
<b>STEL</b> <input type="text" value="40"/>	<b>Vapor Pressure</b> <input type="text" value="5"/> mm Hg	<b>VP X 1300</b> <input type="text" value="6500"/> ppm
<b>Ceiling</b> <input type="text" value=""/>	<b>Odor Low</b> <input type="text" value="0.017"/> ppm	<b>Odor High</b> <input type="text" value="1.9"/> ppm
<b>Skin</b> <input type="text" value="No"/>	<b>LC50</b> <input type="text" value="4,388"/> ppm	<b>RD50</b> <input type="text" value="980"/> ppm
<b>PEL</b> <input type="text" value="100"/>	<b>Notes</b> OSHA ceiling is 200 ppm, and 600 ppm is 5-min. max. peak in any 3 hrs.	
<b>MAK</b> <input type="text" value="20"/>	<b>Half Life</b> blood: fast phase = 0.5 hour and a slow phase = 13 hours; for mandelic acid, fast phase = 4 hours and slow = 25 hours	
<b>IDLH</b> <input type="text" value="700"/>	<b>BEI</b> Styrene in blood = 0.55 mg/L at end of shift; see ACGIH "1999 TLVs and BEIs" for other BEIs for styrene;	
<b>Units</b> <input checked="" type="radio"/> ppm <input type="radio"/> mg/m3		

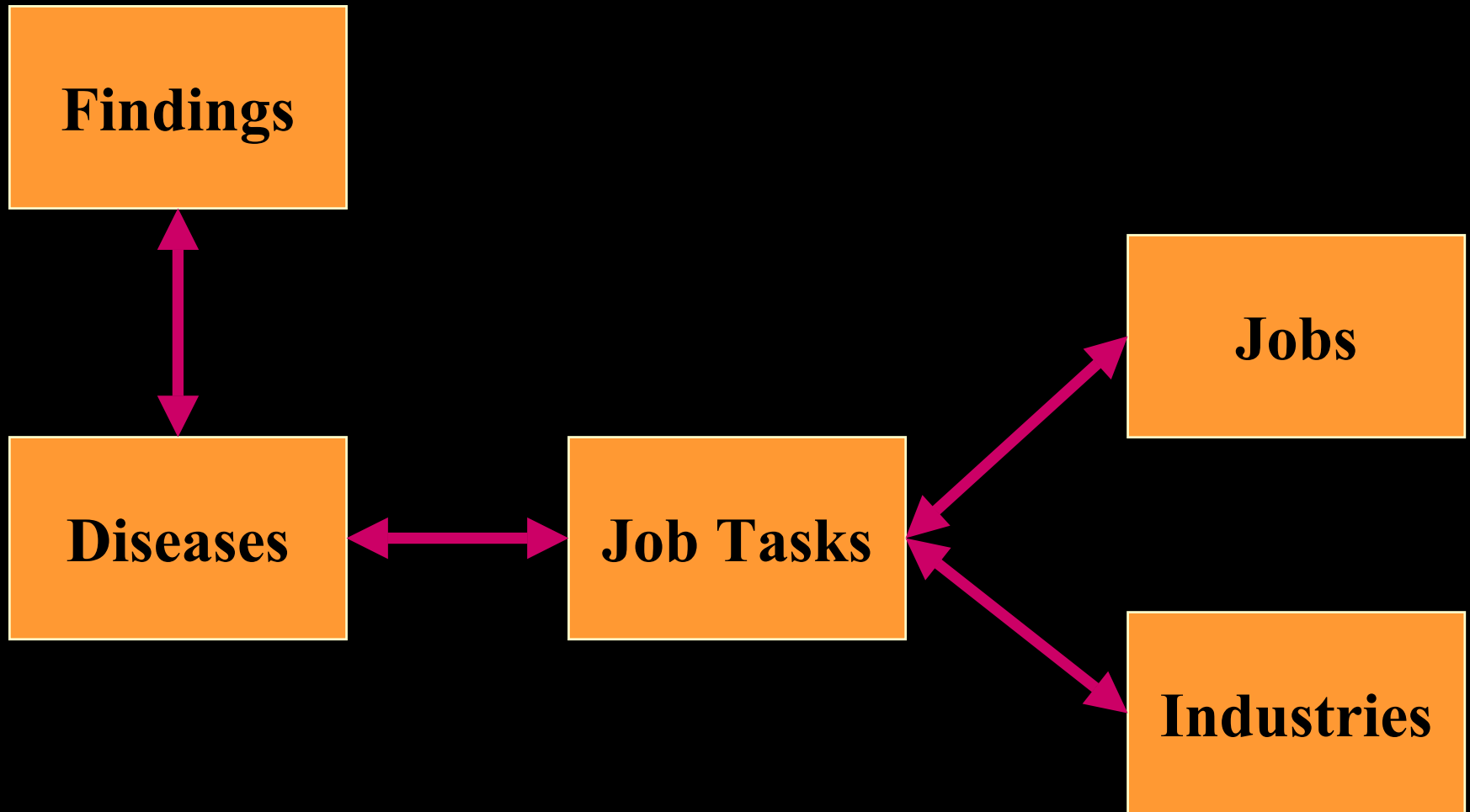
**Excerpts from NIOSH Documentation**

Volunteers exposed to 376 ppm for up to 7 hours experienced unpleasant subjective symptoms and objective signs of neurologic impairment [Stewart et al. 1968]. Drowsiness, nausea, headache, fatigue, and dizziness have been reported in workers exposed to 200 to 700 ppm [AIHA 1959].

**Hyperlink** [Occupational asthma due to styrene: two case reports](#)

Record:      of 989

# *The Diseases Level*



# *9 Categories of Occupational Diseases*



- Airway Diseases
- Pneumoconioses
- Hypersensitivity Pneumonitis
- Infections

# *9 Categories of Occupational Diseases*



- Acute Poisons
- Chronic Poisons
- Metals
- Skin Diseases
- Cancer

# *Web-Based Haz-Map: Finding Agents, Diseases, and Jobs*



The screenshot displays the Web-Based Haz-Map interface. At the top, there are five navigation tabs: "Haz-Map Home", "Custom Search", "Haz-Map Help", "Glossary", and "References". Below these tabs is a blue header bar with the text "Browse Haz-Map". The main content area is white and contains three bulleted categories, each with a numbered list of sub-options:

- **Hazardous Agents**
  1. By Types of Agents
  2. By Adverse Effects
  3. Alphabetically
- **Occupational Diseases**
  1. By Types of Diseases
  2. By Jobs and Symptoms
  3. Alphabetically
- **High Risk Jobs**
  1. By Types of Jobs
  2. Alphabetically

# *Web-Based Haz-Map: Records Related to Chronic Bronchitis*

[Haz-Map Home](#) [Custom Search](#) [Haz-Map Help](#) [Glossary](#) [References](#)

**Browse Haz-Map by Diseases**

**Information about this disease:**  
**Bronchitis, chronic**

- **Symptoms associated with this disease:**
  - cough
  - obstructive defect
  - sputum production
- **Hazardous agents that cause this disease:**
  - Ammonia
  - Coal dusts
  - Coke oven emissions
  - Cotton dust, raw
  - Grain dust
  - Nitrogen dioxide
  - Ozone
  - Silica, crystalline
  - Sulfur dioxide
  - Vanadium pentoxide
  - Welding, fumes & total particulates
- **High risk job tasks associated with this disease:**
  - Arc weld aluminum
  - Arc weld stainless steel
  - Blast, drill, remove, or crush rock, concrete or brick
  - Clean, repair, or dismantle oil-fired furnaces or boilers
  - Extract coal
  - Generate grain dust
  - Grind or cut tiles, stones, concrete, bricks, or terrazzo
  - Inhale dust in livestock confinement building
  - Load or dump dusty rock, stone, or sand



# *Identification of Hazardous Job Tasks Is Crucial for Prevention*

- It is not the mere presence of chemicals in the workplace that puts workers at risk.
- Hazardous job tasks open one or more exposure routes, usually skin absorption or inhalation.
- What is the specific job task that puts the workers at risk for the disease?

# *Examples of the 178 Hazardous Job Tasks*

- Manufacture polyurethane products
- Remove insulation installed before 1975
- Extract coal
- Inhale dust of moldy hay, silage, straw or grain



# *Examples of the 178 Hazardous Job Tasks*

- Handle medical needles or surgical instruments;
- Operate internal combustion engine with inadequate ventilation;
- Repair or maintain gasoline or jet fuel tanks;
- Remove lead coatings;



## *In Summary*

- Surveillance of occupational diseases depends on physician recognition.
- To recognize occupational diseases, health & safety professionals need quick access to comprehensive information.
- A relational database of occupational toxicology can store and display summarized information for clinical and preventive decision support.